8-2 Parabolas

Conic Sections --figure that can be obtained by slicing a double cone

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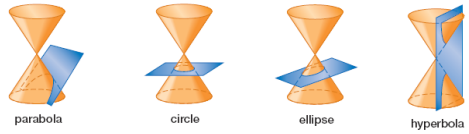
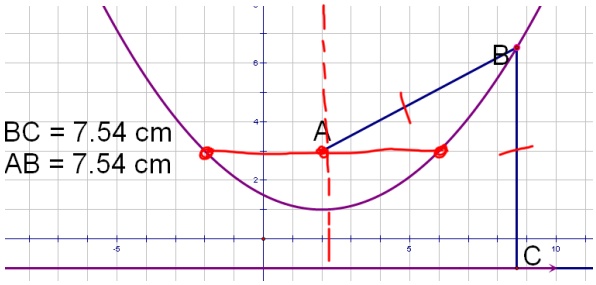


Parabola --set of all points in a plane that are the same distance from a given point (focus) and a given line (directrix)



Equation of a Parabola

$y = a(x - h)^2 + k$

V(h, k)

+a opens up

-a opens down

aos x = h

Distance between vertex and focus
Distance between vertex and directrix $\left|\frac{1}{4a}\right|$

Latus rectum--The segment that goes through the focus and is perpendicular to the axis of symmetry

Length = $\left|\frac{1}{a}\right|$

Distance between endpoints and the focus = $\left|\frac{1}{2a}\right|$ *

Example 1:

$y = \frac{1}{16}(x-2)^2 + 3$

V(2,3)

$a = \frac{1}{16}$ $\left|\frac{1}{4a}\right| = \frac{1}{4\cdot\frac{1}{16}} = 4$

x = 2 a.o.s

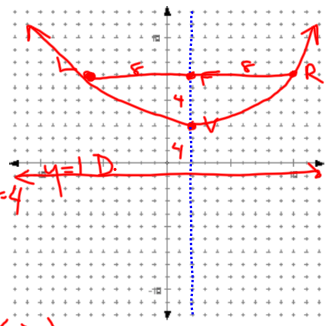
F(2,7)

D y = -1

L(-6,7)

R(10,7)

$LR = \left|\frac{1}{1/16}\right| = 16$



Example 2:

$4(y + 9) = (x + 6)^2$

$y+9 = \frac{1}{4}(x+6)^2$

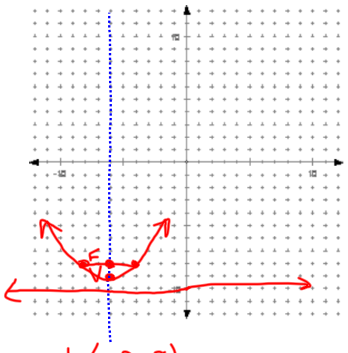
$y = \frac{1}{4}(x+6)^2 - 9$

V(-6, -9)

a.o.s $x = -6$

$\left|\frac{1}{4(\frac{1}{4})}\right| = 1$

F(-6, -8) D: $y = -10$ L(-8, -8) R(-4, -8)



Equation of a Parabola

Left / Right

$x = a(y - k)^2 + h$

V(h, k)

+a opens right

-a opens left

aos $y = k$

Distance between vertex and focus
Distance between vertex and directrix $\left|\frac{1}{4a}\right|$

Latus rectum--The segment that goes through the focus and is perpen $\left|\frac{1}{a}\right|$ ır to the axis of symmetry

Length =

Distance between endpoints and the focus = $\left|\frac{1}{2a}\right|$

Example 2:

$x = -\frac{1}{12}(y-5)^2 - 2$

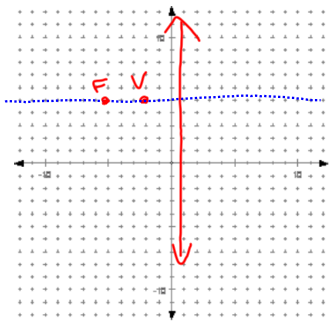
V(-2, 5)

a.o.s $y = 5$

$\left|\frac{1}{4(-\frac{1}{12})}\right| = 3$

F(-5, 5)

D $x = 1$



HW

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parabola_sketch.gsp